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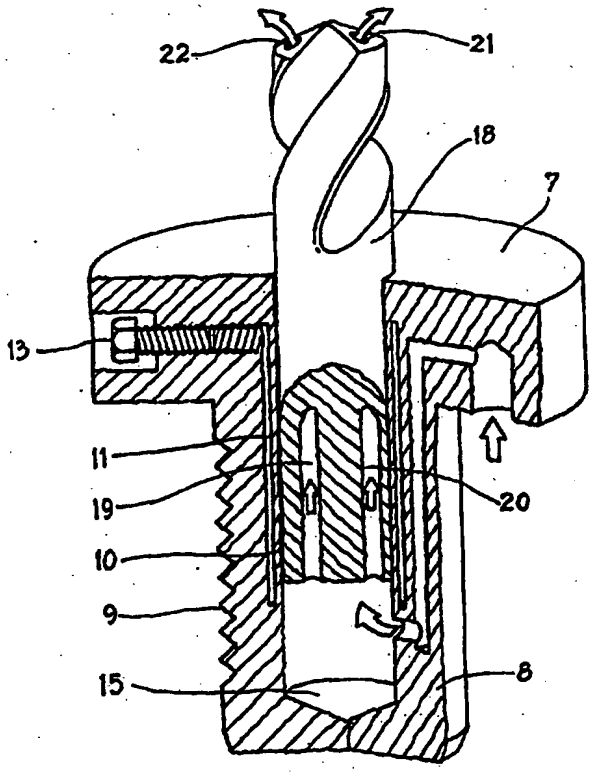
(54) Title: DEVICE FOR COOLING A MACHINE TOOL RETAINED IN A REVOLVER PLATE

(57) Abstract

A machine tool (18) is retained in a tool holder (3) which is to be secured in a revolver plate (1). A coolant supply in the revolver plate communicates with an inlet opening (16) in a collarlike front end (7) of the tool holder (3). The coolant then passes through a channel (17) in the cylindrical part (8) of the holder into the tool holding cavity (14) where it can pass through one or more channels (19, 20) from the rear to the front end of the tool (18).



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Device for cooling a machine tool retained in a revolver plate.

The present invention relates to a device for cooling of a machiningtool. In most types of machining it is generally necessary to provide cooling for the machiningtool and this is achieved by directing one or more waterjets towards the tip of the machiningtool, emanating from the toolholder or from some other part of the machine. This method of cooling a machiningtool functions satisfactorily, but does not allow for any changes in design to reduce the overhang of the machiningtool. All equipment for cooling is demanding and usually requires special toolholders. Such a toolholder is placed in a recess in a machine or machiningcentre e.g. revolverplate, beside which recess is a connection to the coolant supply. A toolholder for a tool equipped to receive a coolant may thus be placed in a recess in any machine at all, provided the machine also has a connection to a coolant supply.

The present invention relates to a toolholder for a machiningtool of the type mentioned above, said toolholder with machiningtool intended to be secured in a recess in a machine, wherein toolholder and machine are provided with suitable attachment means to ensure that the toolholder is firmly anchored in its recess and the machiningtool can thus perform the desired machining. The holder is preferably in the form of a peripheral flange provided with a shaft having a cavity for a machiningtool. The shaft provided externally with a threadlike surface designed to cooperate with a moveable threadlike part inside said recess so that the latter threaded part is pushed to abutment with the threaded part of the shaft in order to achieve retention. A coolant connection is arranged beside the recess in e.g. revolverplate intended to cooperate with a connection for coolant in the toolholder inserted. The toolholder is thus supplied coolant and according to the invention the coolant in the toolholder is not conducted through the cavity of the toolholder to reach the machiningtool externally. Instead, according to the invention the coolant received to the cavity is conducted through channels in the cylindrical shaft of the toolholder to the bottom of the shaft. The coolant thus reaches the machiningtool at its back end. To enable cooling of the machiningtool

it will have one or more through channels with their orifices at the front end of the machiningtool preferably at the part of the machiningtool performing the machining. The machiningtool according to the invention may be inserted directly in the cavity or the toolholder provided the machiningtool and the cavity have the same diameter. However, if the machiningtool and the cavity have different diameters the machiningtool must be provided with a peripheral sleeve/collet.

In standard and similar machiningtools such as boring bars with axially milled periphery, coolant may pass along the length of the machiningtool. The machining side of the flange of the toolholder can be provided with nozzles connected to the channel system, which supplies coolant to the bottom of the holder so that a machiningtool inserted can also be cooled from the outside.

To ensure firm retention of a machiningtool in a toolholder it is advisable for the inner wall of the toolholder to be flexible, for at tubular space to be arranged inside said wall, and for this space to be filled with a pressure medium such as oil or grease and to then influence the pressure medium by suitable means, such as a screw, causing the inner wall to move inwards for effective retention of a machiningtool.

The outer part of the shaft of the toolholder may be provided with a surrounding wall that is fully or partially flexible, there being a space behind said wall for a pressure medium, enabling the outer surrounding wall to move outwards, thus effectively retaining the toolholder in its recess in, for instance a revolverplate.

According to the invention the spaces used for retaining a machiningtool and for retaining a toolholder in a recess may be connected and filled with a predetermined quantity of pressure medium. This enables the flexible inner wall of the recess and the flexible outer wall of the toolholder to be controlled using single adjustment means such as a screw.

Further characteristics of the present invention will be revealed in the appended

claims.

The present invention will be described in more detail with reference to the accompanying two drawings, in which

Figure 1 shows a revolverplate in a machine or machining centre including a toolholder,

Figure 2 shows a separate toolholder of the type referred to in Figure 1, and

Figure 3 shows a toolholder in Figure 2 provided with a machiningtool.

Figure 1 shows a revolverplate 1 designed for attachment to an optional machine or machining centre by way of its central opening 2. The revolverplate 1 thus shows a toolholder 3 without machiningtool and a recess 4 for a toolholder. The recess is provided with a part 5, which is radially and otherwise movable and which is rectangular or cylindrical and has a threadlike surface 5. Beside the recess 4 is a connection 6 for the supply of coolant. The connection is connected to a coolant source. The recess 4 is designed for insertation of a toolholder 3, and such a toolholder is shown separately in Figures 2 and 3. The toolholder consists of a flange part 7 constituting the end of a shaft 8, preferably cylindrical in shape. The shaft is provided on the outside with a rectangular field provided with a permanent threadlike part 9 designed to cooperate with the moveable part containing a rectangular threadlike surface 5. The toolholder has a cavity 14 provided with a bottom 15. The cavity 14 has an inner, flexible wall 10 and behind the flexible wall is a tubular space 11. Said space is in communication with a channel 12. The channel 12 is closed by a screw 13 that can be moved in and out as desired. Channel 12 and the tubular space 11 are filled with a pressure medium such as oil or grease. Activating screw 13 will cause said pressure medium to influence the wall 10 so that it expands inwards. The backside of the flange part 7 of the toolholder is provided with a connection means 16 intended for cooperation with the connection 6 in Figure 1. The connection means 16 communicates with a channel 17 opening into the bottom 15 of the cavity 14. The outer surrounding wall of the shaft 8 may consist fully or partially of a flexible wall

and, behind this, a substantially tubular space filled with a pressure medium. Said spaces are in communication with a screw capable of influencing the pressure medium so that the outer surrounding wall can move outwards, thereby increasing retention of the toolholder 3 in a recess in the machine e.g. revolverplate. However it is probably advisable to allow the tubular space for the flexible outer wall to be in communication with the tubular space 11 next to the cavity 14 of the toolholder. This allows both the innerwall and the outerwall to be influenced by a single screw 13.

The toolholder 3 thus has a shaft that is substantially cylindrical, but it should be obvious that toolholdermethods may be used in which the shaft may have any suitable shape whatsoever, provided it is effectively secured in a machine.

The cavity 14 is designed to receive a machiningtool 18 in the form of for example a drill or boring bar and for the invention to function, the machiningtool will have at least one through hole or channel from its backend to the orifice located at the tip of the machiningtool. Figure 3 shows two channels 19 and 20 with outlets 21 and 22 at the tip of the tool. The two channels 19 and 20 are straight, but it should be evident that they may have any suitable shape whatsoever.

It should also be clear that the channel 17 may also be connected to nozzles on the machining side of the flange 7 or on the circumference of the flange 7, and in that case one or more nozzles can be directed towards the machiningtool 18 enabling it to be cooled from the outside as well.

Referring to Figure 3, a machiningtool 18 is shown as inserted into the cavity 14. When the machiningtool 18 has been inserted fully into the cavity 14 of the toolholder Fig 3 the toolholder 3 with machiningtool 18 will be inserted into a recess 4 in the revolverplate 1 of a machine in the way that the rectangular threaded part on the shaft 8 is located immediately opposite the radially, or otherwise, movable threaded part 5. In inserted position of the toolholder 3, said threaded part 5 is moved so that the threaded sections 5 and 9 come into locking

contact with each other. The toolholder is thus well secured in the revolverplate 1. In this situation the screw 13 is activated, whereupon the wall 11 is forced to move inwards, thereby retaining the machiningtool 18. If the shaft 8 is also provided with a flexible outer wall with pressure medium behind it, the flexible wall will then move towards the recess 4 in the revolverplate 1, thus retaining the toolholder even more securely than by means of threads 9 and 15. Since the connection 16 is in contact with the connection 6, coolant will be supplied to the machiningtool via channel 17 and bottom 18, which coolant will subsequently pass through the channels 19 and 20 in the machiningtool 18 and out through the openings 21 and 22 to directly reach the machining point, where cooling is absolutely necessary.

CLAIMS

1. A device in a revolverplate (1) provided with a number of recesses 4 for the receipt of exchangeable toolholders (3) with a machiningtool (18) secured therein, each toolholder (3) having a collarlike endportion (7) for abutment against the revolverplate (1),
c h a r a c t e r i z e d in that each collarlike end (7) has a channel (16, 17) for coolant, the inlet opening (16) of said channel (16, 17) being arranged on the backside of the collarlike end part (7), abutting against the revolverplate (1), said inlet opening (16) being designed to communicate with a coolant outlet (6) on an opposite part of the revolverplate (1), and said channel (16, 17) communicating via the cylindrical part (8) for retaining machiningtool (18), the latter having one or more through channels (19, 20, 21, 22) running internally or externally from one end of the machiningtool to the other end of the tool, in order to convey said coolant further to the machining end of the tool (18).

2. A device as claimed in claim 1,
c h a r a c t e r i z e d in that the cylindrical part (8) of the toolholder (3) has a cavity wall (10) that is displaceable inwardly and is surrounded by a tubular space (11) containing a pressure medium such as grease or oil influencing said cavity wall (10).

3. A device as claimed in claim 1,
c h a r a c t e r i z e d in that one or more channels (19, 20, 21, 22) in the machiningtool have an extension diviating from straight being, for instance, spiral in shape.

4. A device as claimed in claim 1,
c h a r a c t e r i z e d in that the machiningtool (18) is provided with a surrounding intermediate collar compensating the difference in diameter between the machiningtool (18) and the cavity (14) of the toolholder (3).

5. A device as claimed in claim 2,
characterized in that the length of the displaceable cavity wall (10) is sufficient to ensure effective retention of a machiningtool (18) with or without intermediate collar.

6. A device according to claim 1,
characterized in that said unit such as a shaft (8) has an outer, peripheral surface that is fully or partially displaceable outwardly, there being a space behind said wall for a pressure medium such as grease or oil in order to achieve displacement of a wall part exterior thereto.

7. A device as claimed in claims 2 and 6,
characterized in that a predetermined quantity of pressure medium is used for displacement of said two types of wall and that a singel arrangement (13) is used to control influencing the inner wall (10) and the outer wall.

8. A device as claimed in claims 2 and 6,
characterized in that a predetermined quantity of pressure medium is used for each space for displacement of the inner wall (10) and the outer wall and that two separate arrangements (13) are used to achieve displacements of the two types of walls.

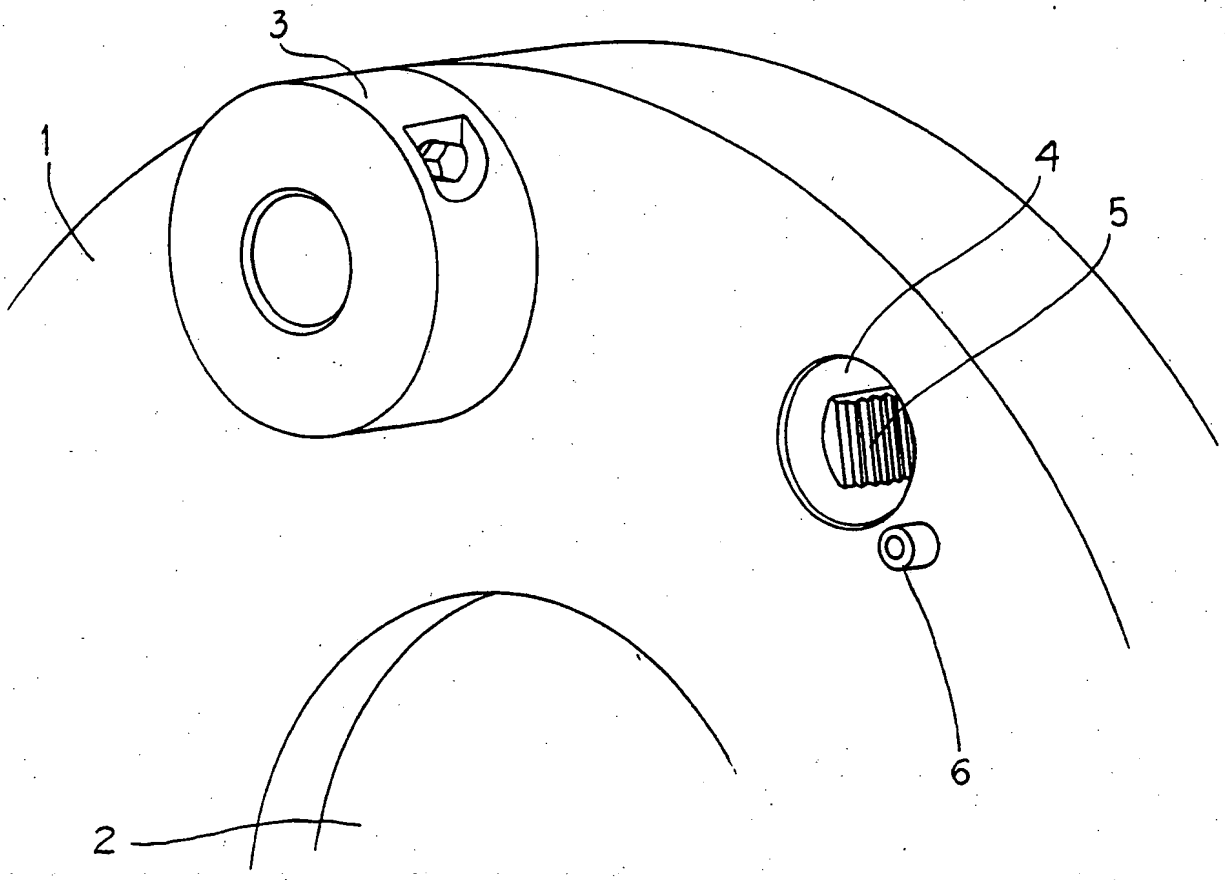


Fig. 1

Fig. 2

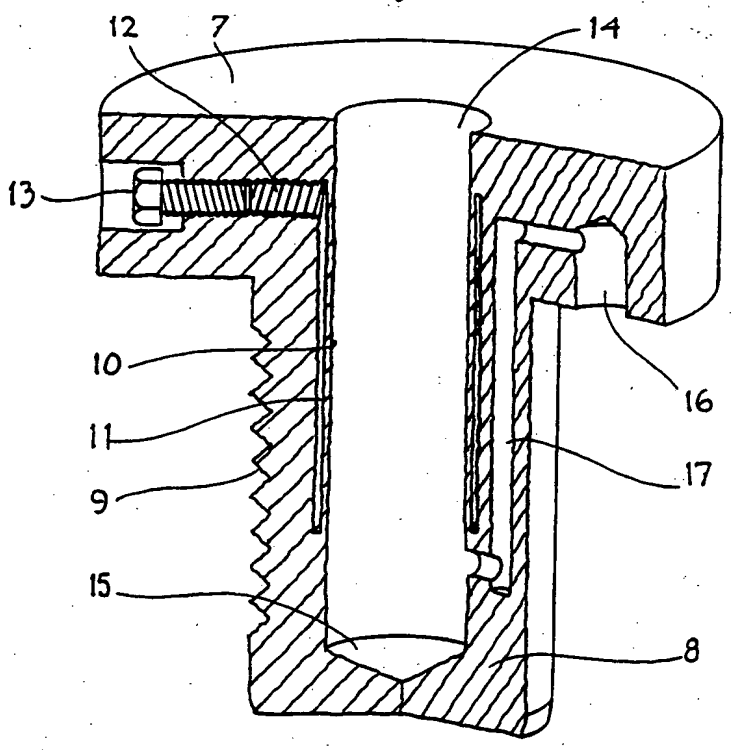
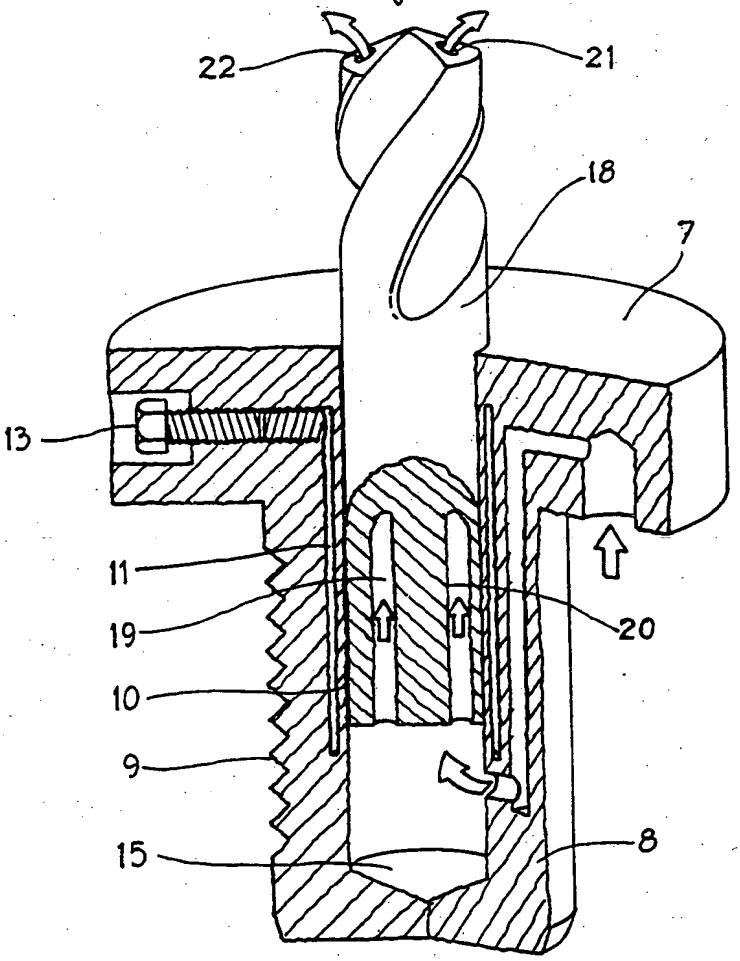


Fig 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/00292

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B23B 27/10, B23B 31/40, B23Q 11/10
According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

IPC6: B23B, B23C, B23Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US, A, 3215443 (CECIL J. IRVING), 2 November 1965 (02.11.65) --	1,3
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A	EP, A, 0329633 (SPIREX TOOLS AB), 23 August 1989 (23.08.89), column 3, line 3 - line 10, figures 1, 2 --	5

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO, A, 9318880 (SPIREX TOOLS AB), 30 Sept 1993 (30.09.93), figures 1-3, abstract ---	2,6-8
A	DE, B, 2725655 (RAMSBRO, BÖRJE), 26 July 1979 (26.07.79), column 4, line 24 - line 35 --- --------	2,7,9

INTERNATIONAL SEARCH REPORT

Information on patent family members

03/05/95

Interna[redacted]al application No.
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